

App. No. 09/763,282

Response mailed March 14, 2005

Re: Office Action mailed January 14, 2005

### **LISTING OF THE CLAIMS**

1-14. (canceled)

15. (withdrawn) A method for removing undesirable flue gas components, said method comprising:

(a) combusting coke comprising sponge coke in an amount in the range from about 40% to 100% by weight and having volatile combustible materials in an amount in the range from about 13% to about 50% by weight;

(b) injecting conversion reagents into flue gas with sufficient mixing and sufficient residence time at sufficient temperature to convert undesirable flue gas components to collectible particulates upstream of a particulate control device (PCD); and

(c) collecting said particulates in said particulate control device, said particulate control device including a PCD process selected from the group consisting of electrostatic precipitation (dry or wet), filtration, cyclones, and wet scrubbing.

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16. (withdrawn) A method for removing undesirable flue gas components according to claim 15, further comprising:

recycling unreacted flue gas conversion reagents to increase reagent utilization, wherein the rate of recycling exceeds 5% by weight of collected flyash.

17. (withdrawn) A method for removing undesirable flue gas components according to claim 15, further comprising:

regenerating and reusing spent flue gas conversion reagents using a process selected from the group consisting of hydration, precipitation, and other unit operations;

wherein the rate of regeneration exceeds 70% by weight of collected flyash, and less than 30% of the collected flyash is disposed as a purge (or blowdown) stream, containing high concentration of impurities.

18. (withdrawn) A method for removing undesirable flue gas components according to claim 17, further comprising:

using the purge stream from the regeneration process as a resource for valuable metals; and

extracting and purifying said valuable metals.

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19. (previously presented) A process of producing coke, said process comprising the steps:

- (a) Obtaining a coke precursor material derived from carbonaceous origin;
- (b) Subjecting said coke precursor material to a thermal cracking process, said thermal cracking process performed for sufficient time and at sufficient temperature and under sufficient pressure so as to promote the production of porous sponge coke; and
- (c) Adding at least one chemical compound of predetermined quality and predetermined quantity to said porous sponge coke in a coke quenching portion of said thermal cracking process;

Whereby said at least one chemical compound substantially improves the combustion characteristics, ash characteristics, or environmental impacts of said coke when used in a combustion process.

20. (previously presented) A process according to claim 19 wherein said coke precursor material is derived from crude oil, coal, shale oil, or tar sands.

21. (previously presented) A process according to claim 19 wherein volatile combustible materials (VCMs) are present in an amount in the range of from about 13% to about 50% by weight.

22. (previously presented) A process according to claim 21 wherein said VCMs are present in an amount in the range of from about 15% to about 30% by weight.

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23. (previously presented) A process according to claim 19 further comprising introducing at least one chemical compound into said thermal cracking process to improve the adsorption characteristics of said coke product.

24. (original) A process according to claim 23 wherein said at least one chemical compound is selected from the group consisting of hydrogen, plastics, wood wastes, coals, and non-volatile hydrocarbons with appropriate cracking/coking characteristics.

25. (previously presented) A process according to claim 19 wherein adding at least one chemical compound is used for further coke treatment, said coke treatment including the removal of at least one undesirable chemical compound, said coke treatment comprising the steps:

- (a) Selective addition of at least one chemical reactant in a fluid that passes through said coke; and
- (b) Maintaining sufficient temperature, sufficient pressure, and sufficient residence time to cause a reaction of desired degree.

26. (previously presented) A process according to claim 25 wherein said at least one undesirable chemical compound contains sulfur, nitrogen, or a metal.

27. (original) A process according to claim 25 wherein said fluid is a coke quench medium.

28. (original) A process according to claim 25 further comprising calcining said coke to remove excessive VCMs and alter crystalline structure to low porosity coke with

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sufficient density such that said coke is adapted to be used for steel or aluminum manufacture.

29. (previously presented) A process according to claim 19 wherein coke adsorption characteristics are used for further coke treatment, said coke treatment including the addition of said at least one chemical compound in a fluid that passes through said coke, said at least one desirable chemical compound selected from the group consisting of hydrocarbons, chemical adsorbents, and oxygen-containing compounds.

30. (original) A process according to claim 29 wherein said fluid is a coke quench medium.

31. (previously presented) A process according to claim 29 wherein said chemical adsorbents are sulfur sorbents.

32. (canceled)

33. (withdrawn) A process according to claim 77 wherein said at least one plastic is added to said thermal cracking process in a feed recycle stream downstream of a fractionator.

34. (previously presented) A coke product made in accordance with a process according to claim 19.

35. (previously presented) A coke product according to claim 34 wherein said coke product is adapted for use as an adsorption media.

36. (previously presented) A coke product according to claim 35 wherein said coke

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product is adapted to be used for fuel after serving as said adsorption media.

37. (previously presented) A coke product according to claim 34 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

38. (previously presented) A coke product according to claim 37 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

39. (previously presented) A coke product according to claim 34 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

40. (previously presented) A coke product made in accordance with a process according to claim 22.

41. (previously presented) A coke product according to claim 40 wherein said coke product is adapted for use as an adsorption media.

42. (previously presented) A coke product according to claim 41 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

43. (previously presented) A coke product according to claim 40 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

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44. (previously presented) A coke product according to claim 43 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

45. (previously presented) A coke product according to claim 40 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

46. (previously presented) A coke product made in accordance with a process according to claim 23.

47. (previously presented) A coke product according to claim 46 wherein said coke product is adapted for use as an adsorption media.

48. (previously presented) A coke product according to claim 47 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

49. (previously presented) A coke product according to claim 46 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

50. (previously presented) A coke product according to claim 49 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

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51. (previously presented) A coke product according to claim 46 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

52. (previously presented) A coke product made in accordance with a process according to claim 25.

53. (previously presented) A coke product according to claim 52 wherein said coke product is adapted for use as an adsorption media.

54. (previously presented) A coke product according to claim 53 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

55. (previously presented) A coke product according to claim 52 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

56. (previously presented) A coke product according to claim 55 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

57. (previously presented) A coke product according to claim 52 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

58. (previously presented) A coke product according to claim 52 wherein the sulfur

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content of said coke product is sufficiently reduced to enable said coke product to be used for steel or aluminum manufacture.

59. (previously presented) A coke product made in accordance with a process according to claim 29.

60. (previously presented) A coke product according to claim 59 wherein said coke product is adapted for use as an adsorption media.

61. (previously presented) A coke product according to claim 60 wherein said coke product is adapted to be used for fuel after serving as said adsorption media.

62. (previously presented) A coke product according to claim 59 wherein said coke product is adapted for use as an adsorption media for adsorption and removal of at least one undesirable flue gas component from a combustion process.

63. (previously presented) A coke product according to claim 62 wherein said at least one undesirable flue gas component is selected from the group consisting of sulfur oxides, nitrogen oxides, carbon dioxide, dioxins, furans, mercury compounds, and other air toxics comprised of hydrocarbon or a metal compound.

64. (previously presented) A coke product according to claim 59 wherein the sulfur content of said coke product is adapted to enhance the adsorption of mercury and other metal compounds.

65. (previously presented) A coke product according to claim 59 wherein the sulfur content of said coke product is sufficiently reduced to enable said coke product to be

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used for steel or aluminum manufacture.

66-72. (canceled)

73. (withdrawn) A method for producing energy, said method comprising combusting a fuel, said fuel comprising coke, said coke comprising sponge coke in an amount in the range from about 40% to 100% by weight and volatile combustible materials (VCMs) in an amount in the range from about 13% to about 50% by weight.

74. (withdrawn) A method according to claim 73 wherein said VCMs are present in an amount in the range of from about 15% to about 30% by weight.

75. (withdrawn) A method for producing energy according to claim 73 wherein said fuel comprises a mixture of said coke and at least one other fuel, and wherein the heat release ratio of said coke to said at least one other fuel in said mixture is greater than about 1:4.

76. (withdrawn) A method according to claim 75 wherein said at least one other fuel is coal, fuel oil, natural gas, by-products, or wastes.

77. (withdrawn) A process of producing coke, said process comprising the steps:

- (a) Obtaining a coke precursor material derived from carbonaceous origin;
- (b) Subjecting said coke precursor material to a thermal cracking process, said thermal cracking process performed for sufficient time and at sufficient temperature and under sufficient pressure so as to promote the production of coke; and

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- (c) Adding at least one plastic to said thermal cracking process at a point with sufficient temperature to fluidize said at least one plastic and sufficient residence time to mix with said coke precursor material to achieve desired cracking temperature prior to a reaction chamber used in said thermal cracking process.

78. (withdrawn) A process according to claim 77 wherein said at least one plastic is added to said coke precursor material downstream of a heater used in said thermal cracking process.

79. (withdrawn) A process according to claim 77 wherein said plastics are selected from the group consisting of high density polyethylene, low density polyethylene, polypropylene, polystyrene, polyvinyl chloride, polyvinyl acetate, polyacrylonitrile, polyurethane, acrylonitrile butadiene styrene (ABS), and other copolymers, plastics, and chemicals having suitable characteristics.

80. (withdrawn) A process according to claim 77 wherein said plastics are added without segregation of types of said plastics.

81. (canceled)

82. (previously presented) A process according to claim 31 wherein said sulfur sorbent is selected from the group consisting of hydrated lime, limestone, hydrated dolomitic lime, calcium compounds, magnesium compounds, sodium compounds, potassium compounds, alkali metal compounds, alkaline earth compounds, and any combination

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thereof.